Highly Migratory Species SWFSC/NMFS Report

NOAA FISHERIES

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SWFSC

PFMC
Item D.1.b
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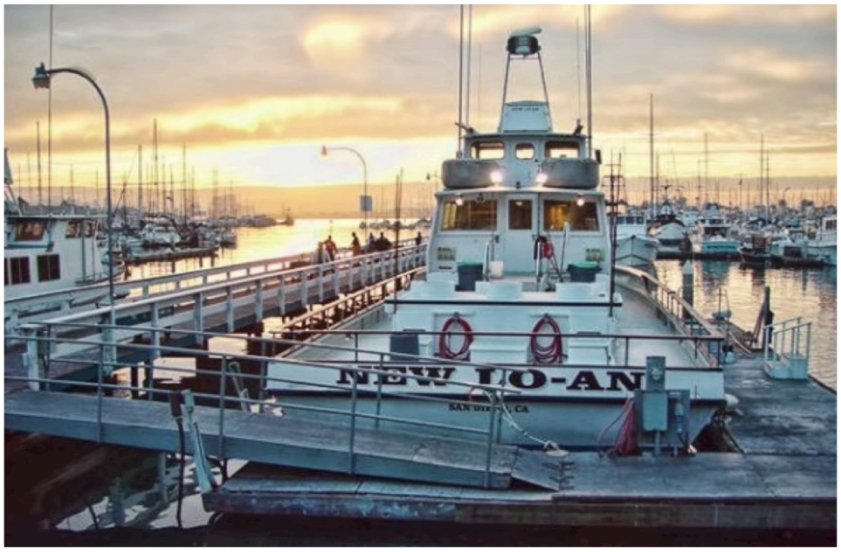
SWFSC HMS Research Activities

- Cooperative tuna biosampling with Southern CA recreational anglers
- Bluefin close-kin mark recapture study
- Albacore biosampling and archival tagging with the commercial surface fleet
- Expanded thresher shark pre-recruit abundance survey
- Bilateral thresher shark assessment

Cooperative Tuna Biological Sampling

- Working with Sportfishing Association of California (SAC) and CPFV fleet to collect biological samples of tunas and related species

- 2007-present; more than 3000 specimens collected



Biological Studies

The tissues collected are used for a range of studies:

Stomachs	Foraging ecology
Muscle/liver tissue	Stable isotope analysis (longer term foraging and stock structure)
Gonads	Reproductive maturity
Otoliths	Ageing/microchemistry (stock structure and spawning site origin)
DNA	Stock structure and close-kin mark recapture

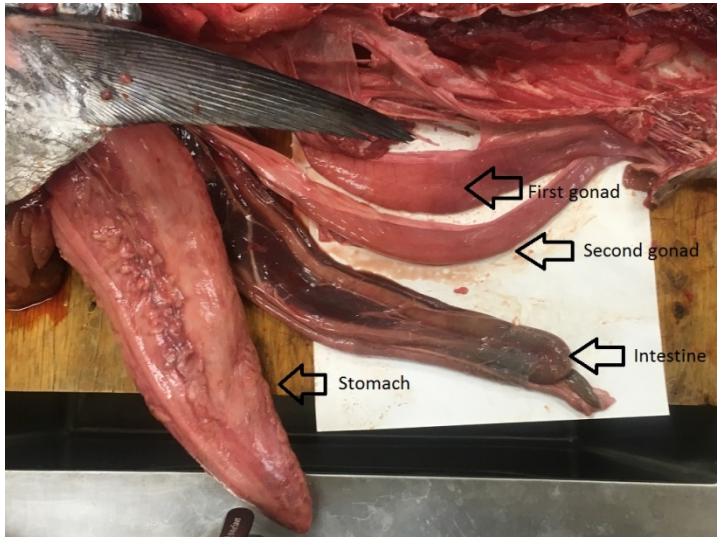
2016 Collections to Date

- The majority of sampled fish have been bluefin

Bluefin	Yellowfin	Skipjack	Other
181	7	n/a	n/a

- Size range collected: 70 to 172 cm fork length
- Weight range collected: 22 to 243 pounds
- Dates collected: April – current
- Smaller bluefin not as available in 2016;
  a greater number of larger fish are being caught

Some Early Results



Bluefin gonads sampled…

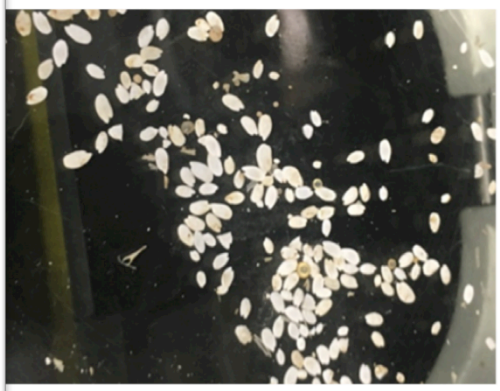
- 8 females – all appeared to be immature, histology results pending
- 4 males – all appeared to be immature except the largest fish (243 lbs) which was functionally mature

Bluefin foraging success appears to be high. Most stomachs are full of a variety of prey.

Krill

Pelagic red crabs

Anchovies



Bluefin Recreational Catch Size Sampling

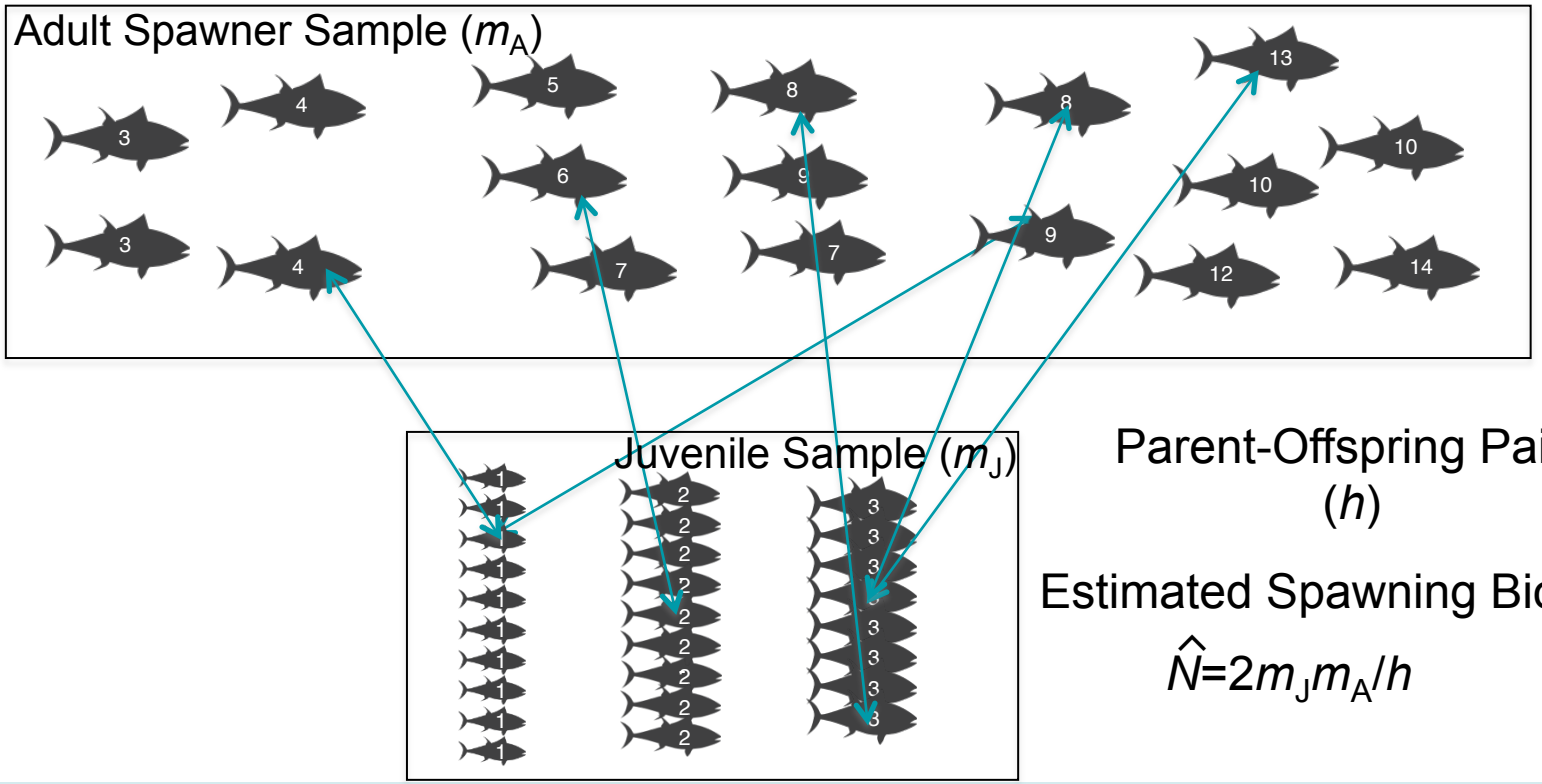
- NOAA started sampling whole fish from trips in 2014, previously done by IATTC
- Whole fish are measured from short- and long-range trips (¾-day to 12-day)
- SAC began onboard size sampling of tunas caught and filleted on ¾ and 1.5 day trips in 2015
- SWFSC, CDFW and SAC staff will validate/verify onboard size sampling on trips during summer 2016

	2014 (July-Sep)	2015 (June-Sep.)	2016 (May-current)
Sample size	1,732	492	132 (to date)
Length range (cm FL)	57.7- 143.3	56.0- 165.1	73.0- 174.5
Avg. length (cm FL)	88.2	87.4	102.9
Age classes	1-4	1-6	1-6

Bluefin Tuna Close-kin Mark Recapture

Partners: SWFSC, CSIRO, ISC, Southern CA sport fleet, Mexico purse-seine fleet, Japan, Korea, Taiwan

- Sampling has begun by ISC Member Nations
- >200 juveniles collected off southern CA to date in cooperation with the sport fleet of which 180 have matching otoliths and tissue samples



Parent-Offspring Pairs (h)

Estimated Spawning Biomass

$$\hat{N}=2m_J m_A/h$$

Albacore Biosampling and Tagging

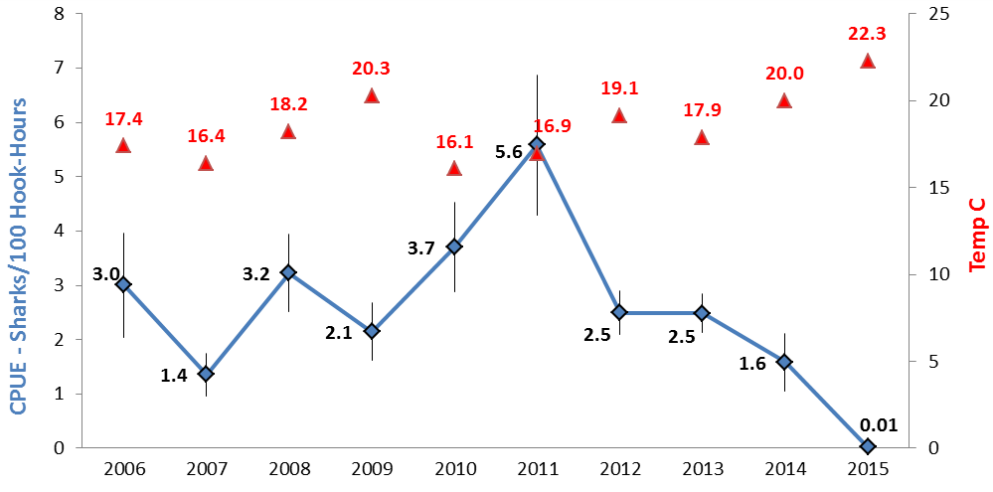
- Cooperative sample collection by commercial surface fleet of OR/WA – 71 specimens collected in 2015
- Studies include foraging ecology, genetics, growth and muscle and otolith chemistry for stock structure
- Archival tagging: 123 archival tags deployed Sept 18-26, 2015 off Westport WA aboard *F/V Royal Dawn*; 1042 deployed to date with 29 recoveries; 80 more deployments planned for 2016

Albacore Sex ID From Genetics

- Collaboration between Canada, Japan, Taiwan, and US
- Albacore show some evidence of sex-differentiated growth and movements
- 2014 stock assessment uses a sex-differentiated population model but sex data are very limited
- A new study to develop a cost effective genetic sex marker initiated in 2015
- Currently, we are identifying the sex marker and obtaining DNA samples from Japan, Taiwan, and US

Expanded Thresher Shark Pre-recruit Survey

- Trends in relative abundance of neonate thresher sharks ~ index of reproductive female sharks
- 2015 survey: Sept 11-28 aboard the chartered commercial longline F/V *Outer Banks*
- Compared to avg. catches of >200 thresher pups/survey in prior yrs, less than 10 were caught
- Anomalous ocean conditions (e.g., Blob, El Niño) may affect distribution of thresher pups
- In 2016, an expanded survey based on spatial-temporal predictions of thresher pup habitat is being conducted to cover a greater area and examine if the thresher nursery area continues north of Pt. Conception. Data/habitat analyses will feed into a revised adaptive survey.
- The survey data were used in the first US-MX bilateral stock assessment of NE Pacific thresher sharks



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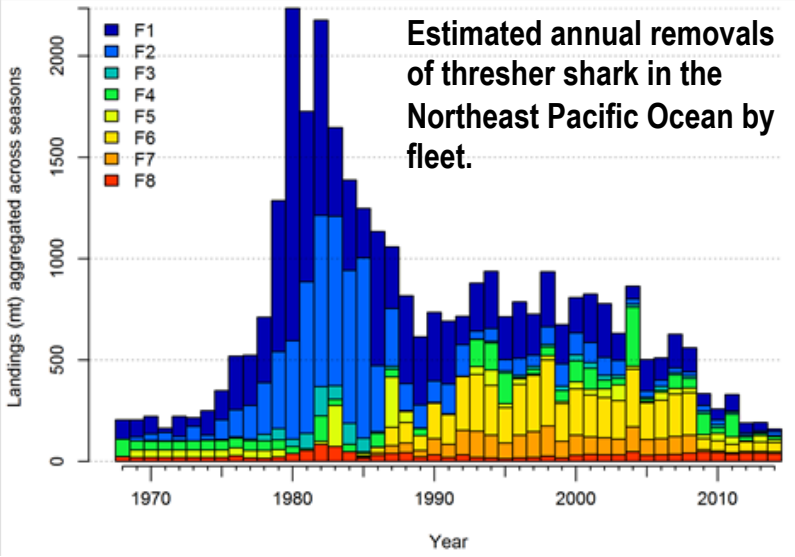
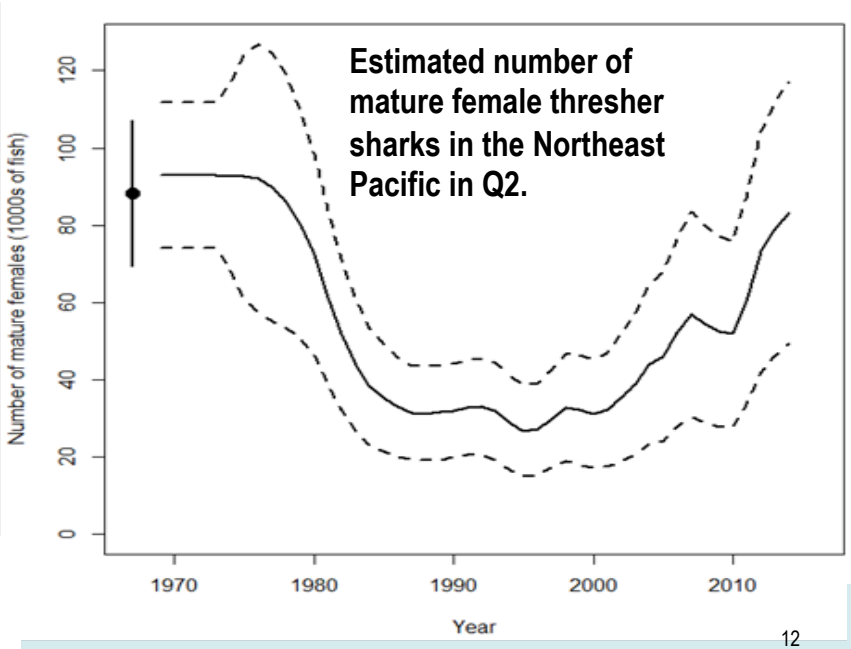
Thresher Shark Assessment(*)

- U.S. west coast (set net, gillnet) and MX (artisanal, longline, gillnet) fishery data, 1969-2014 peaked at > 2000 mt in the early 1980s; recent landings <250 mt annually.
- Abundance began declining dramatically in the early 1980s, was at a lower, relatively stable level from about 1985 to 2000, and has been increasing since; current estimates of abundance are close to the pre-1980s level.
- Fishing intensity is currently relatively low and substantially below the estimated overfishing threshold.





(*) Teo, S.L., Rodriguez, E.G. and Sosa-Nishizaki, O., 2016. Status of common thresher sharks, Alopias vulpinus, along the West Coast of North America. NOAA Tech Memo-SWFSC-557